DAB Key Term Interpretation and Signal Simulation Solution Introduction

Doewe Technologies Application Notes-061-V1.0

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1. Introduction

Digital Audio Broadcasting (DAB) represents the third generation of broadcasting systems following AM and FM. It transmits audio content via digital signals, offering advantages such as high sound quality, strong anti-interference capability, and high spectrum efficiency. The core of DAB technology lies in its unique broadcast architecture and modulation techniques, which enable DAB to deliver near-CD quality audio and rich data services.

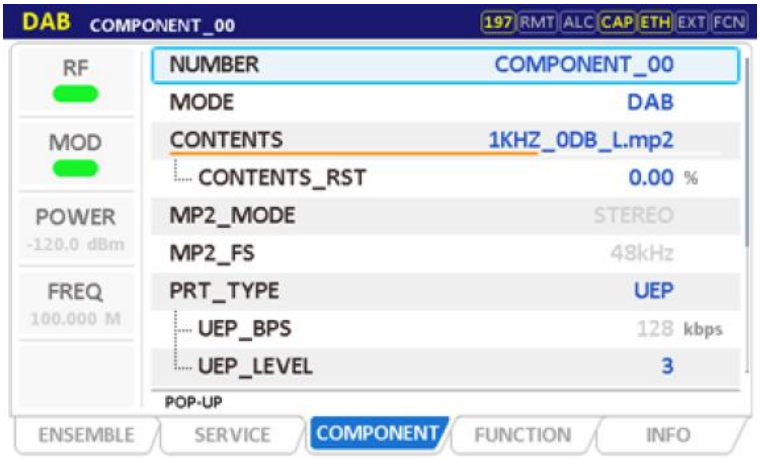
DAB is widely adopted globally, especially in Europe, and has also been promoted in the Middle East, with common applications worldwide. Particularly, as China's new energy vehicles undergo comprehensive development and gradually enter overseas markets, the increasing export demand has spurred a surge in testing the DAB digital broadcast performance of in-vehicle infotainment (IVI) systems.

This document serves as an introductory reference to the overall architecture of DAB and its related key technical terms. It uses RedwoodComm's RWC2010C as an example to demonstrate parameter settings for various components. Due to limited expertise, errors may be inevitable, and we welcome readers' critiques and corrections.

2. DAB Broadcast Architecture

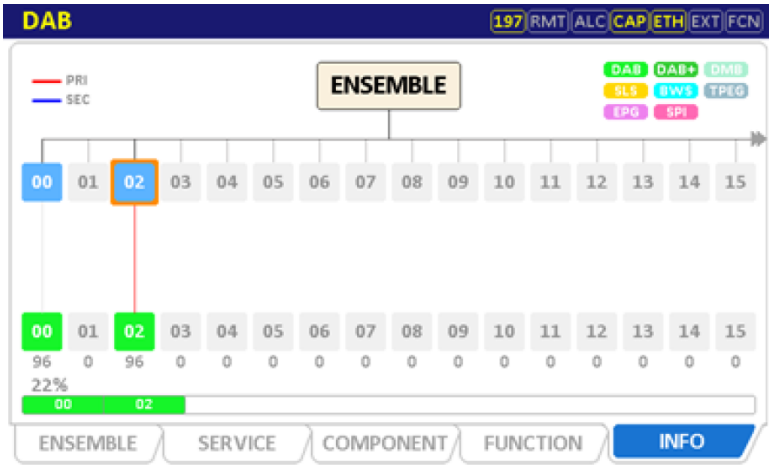
The DAB broadcast architecture primarily consists of the following key components:

2.1 Transmitter End:



Encoder: Converts audio signals into digital format, typically using MPEG-1 Audio Layer II (MP2) encoding, while DAB+ uses the more efficient HE-AAC (High-Efficiency Advanced Audio Coding). The RWC2010C signal generator supports multiple audio encoding formats,including MP2 and HE-AAC, capable of simulating real broadcast environments.

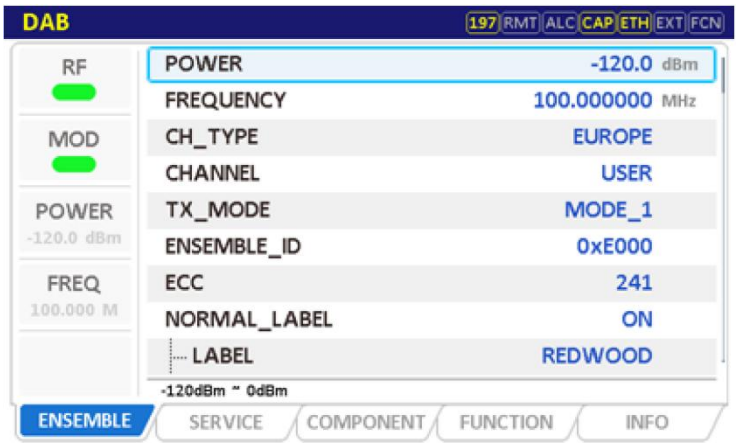
Multiplexer: Multiplexes multiple audio streams and data services into one transport



stream, forming an "Ensemble." The RWC2010C's built-in Ensemble Multiplexer supports up to 64 service components for DAB.

Modulator: Modulates the multiplexed data stream onto a Radio Frequency (RF) carrier using Orthogonal Frequency Division Multiplexing (OFDM) technology. RWC2010C supports OFDM modulation technology, capable of simulating the DAB signal transmission process.

Transmit Antenna: Transmits the modulated signal over the air.



2.2 Transmission Link:

DAB signals are transmitted via wireless broadcast, supporting multiple frequency ranges, typically between 174~240MHz. It employs Single Frequency Network (SFN) technology, allowing multiple transmitter sites to broadcast synchronously on the same channel, effectively saving spectrum resources. Using multiple RWC2010C units can effectively perform SFN testing.

Some typical keywords are as follows:

Receiver End: Device that receives DAB signals.

Antenna: Receives DAB signals transmitted over the air.

Demodulator: Demodulates the received RF signal into a digital data stream.

Demultiplexer: Separates the multiplexed data stream into individual audio streams and services.

Decoder: Decodes the digital audio signal into an audio signal.

User Interface: Provides the interactive interface for audio playback and data services.

3. OFDM Modulation Technology

OFDM (Orthogonal Frequency Division Multiplexing) is the core modulation technology of DAB broadcasting. It achieves efficient data transmission by dividing the spectrum into multiple orthogonal subcarriers and transmitting data simultaneously on these subcarriers. Key characteristics of OFDM technology include:

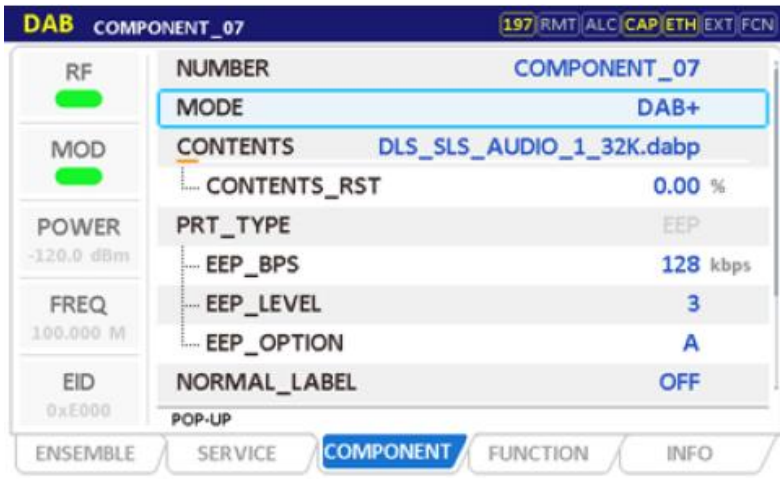
Spectrum Efficiency: By dividing the spectrum into multiple subcarriers, OFDM significantly improves spectrum utilization efficiency.

Anti-Interference Capability: Because data is dispersed across multiple subcarriers, OFDM has strong resistance to multipath interference and frequency-selective fading.

Flexibility: OFDM can dynamically adjust the modulation method of subcarriers according to different channel conditions, thereby optimizing transmission performance.

4. DAB+ Technology Upgrade

DAB+ is an enhanced version of DAB. Core upgrades include adopting the efficient HE-AAC v2 audio coding (MPEG-4 AAC+), which improves compression efficiency by approximately 3 times compared to DAB's MP2 encoding. At the same audio quality, the bitrate is reduced by two-thirds, significantly improving spectrum utilization efficiency, allowing a single channel to accommodate 2-3 times more radio stations. It inherits DAB's anti-interference and CD-level sound quality characteristics while optimizing signal processing, supporting higher-quality audio transmission and additional data services (such as text, images).



The RWC2010C signal generator supports DAB+ technology, capable of generating high-quality DAB+ signals, helping R&D personnel evaluate the performance of DAB+ systems.

5. Professional Test Solution Introduction

DAB broadcast technology, through its unique broadcast architecture and OFDM modulation technology, achieves significant improvements in high sound quality, anti-interference capability, and spectrum efficiency. The DAB+ technology upgrade further enhances audio quality and spectrum efficiency. RedwoodComm's RWC2010C signal generator provides strong support for the R&D and testing of DAB devices. It possesses powerful functions including multiplexer components, ETI/MDI file player functionality, simulated AM/FM and RDS test functions, and an audio analyzer. These functions make the RWC2010C an ideal choice in DAB R&D and testing. Moreover, the 2010C can also be smoothly upgraded to other digital broadcast standards such as DRM or CDR.

Typical functions of the 2010C include:

- Supports DAB, DAB+, DMB, DRM30, DRM+, AM, FM and RDS systems;
- Supports multiplexer autonomous editing of broadcast content, with fully controllable parameter settings for broadcast generation;
- Supports various data services including BWS, TPEG, EWS, EPG, SLS;
- Supports ETI and MDI file player function, and can provide various test streams required for testing free of charge;
- Supports AM/FM radio test functions and fully editable RDS test functions;
- Modular design, users can choose instrument configuration according to their needs;
- Equipped with optional power amplifier RWC9500B to meet maximum input power test requirements.

Doewe Technologies specializes in the R&D, production, and sales of electronic test and measurement instruments/test systems, and can provide full sets of DAB test solutions, including ETI stream solutions. If you are interested in DAB-related testing, welcome to call our company for exchange, contact telephone 010-64327909.